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ATTORNEY DOCKET NO. 10020666-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Daniel A. Usikov

Serial No.: 10/684,000

Examiner: J. Patel

Filing Date: October 10, 2003

Group Art Unit: 2624

Title: TOMOGRAPHIC SYSTEM AND METHOD FOR ITERATIVELY PROCESSING TWO-DIMENSIONAL IMAGE DATA FOR RECONSTRUCTING THREE-DIMENSIONAL IMAGE DATA

COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria VA 22313-1450

TRANSMITTAL OF REPLY BRIEF

Sir:

Transmitted herewith is the Reply Brief with respect to the Examiner's Answer mailed on September 14, 2007. This Reply Brief is being filed pursuant to 37 CFR 1.193(b) within two months of the date of the Examiner's Answer.

(Note: Extensions of time are not allowed under 37 CFR 1.136(a))

(Note: Failure to file a Reply Brief will result in dismissal of the Appeal as to the claims made subject to an expressly stated new grounds of rejection.)

No fee is required for filing of this Reply Brief.

If any fees are required please charge Deposit Account 50-1078.

Respectfully submitted,

Daniel A. Usikov

By

Jody C. Bishop
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Reg. No. 44,034

Date: November 14, 2007

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I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with § 1.6(a)(4).

Dated: November 14, 2007

Signature: Donna Forbit
(Donna Forbit)

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Docket No.: 10020666-1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Daniel A. Usikov

Application No.: 10/684,000

Confirmation No.: 3446

Filed: October 10, 2003

Art Unit: 2624

For: TOMOGRAPHIC SYSTEM AND METHOD
FOR ITERATIVELY PROCESSING TWO -
DIMENSIONAL IMAGE DATA FOR
RECONSTRUCTING THREE-DIMENSIONAL
IMAGE DATA

Examiner: J. Patel

REPLY BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

As required under § 41.41(a)(1), this Reply Brief is filed within two months of the Examiner's Answer dated September 14, 2007, and is in furtherance of the Appeal Brief filed on August 8, 2007. No fee is required for this REPLY BRIEF.

This brief contains items under the following headings pursuant to M.P.E.P. § 1208:

- I. Status of Claims
- II Ground of Rejection to be Reviewed on Appeal
- III. Argument
- IV Conclusion

I. STATUS OF CLAIMS

The status of claims remains as identified in the Appeal Brief submitted August 8, 2007.

II. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The grounds of rejection to be reviewed remain as identified in the Appeal Brief submitted August 8, 2007.

III. ARGUMENT

Appellant respectfully traverses the outstanding rejections of the pending claims, and requests that the Board reverse the outstanding rejections in light of the remarks contained herein. As in the Appeal Brief of August 8, 2007, Appellant argues many of the rejected claims separately. Thus, Appellant respectfully asserts that separately argued claims do not stand or fall together, *see* 37 C.F.R. § 41.37(c)(1)(vii).

Appellant hereby reasserts those arguments that are presented for the separately argued claims in Appellant's Appeal Brief. For brevity, Appellant does not include those arguments herein, but instead submits the following supplemental remarks in reply to the Examiner's Answer.

I. Rejections Under 35 U.S.C. §102 over *Picard*

Claims 1-6 and 13-20 are rejected under 35 U.S.C. §102(b) as being anticipated by *Picard*. Appellant respectfully traverses this rejection because *Picard* fails to teach all elements of claims 1-6 and 13-20, as discussed in the August 8, 2007 Appeal Brief and further discussed below. In particular, the independent claims are addressed further herein, and Appellant respectfully reasserts the arguments previously presented in the Appeal Brief for the separately argued dependent claims.

Independent Claim 1

Independent claim 1 recites:

A method for processing 2D image data for reconstructing 3D image data therefrom, the method comprising:
receiving a plurality of 2D images acquired at different angles of view;
and
iteratively processing the received 2D images to reconstruct 3D image data therefrom. (Emphasis added).

Picard fails to teach iteratively processing received 2D images to reconstruct 3D image data therefrom. Instead, as discussed in the Appeal Brief of August 8, 2007, *Picard* is directed to calibrating an X-ray imaging device, in which *Picard* appears to teach iteratively processing 2D images to automatically determine parameters or calibration coefficients of the X-ray imaging device. While *Picard* mentions that its X-ray imaging device may be a device that captures 2D radiographic images at various different angles of incidence so that the captured 2D radiographic images may then be used to reconstruct 3D information, *Picard* does not address the reconstruction techniques that are employed for performing such reconstruction of 3D information from the captured 2D radiographic images. *Picard* certainly fails to teach iterative processing of the 2D images to reconstruct 3D image data. Instead, *Picard* is primarily focused on calibrating its X-ray imaging device that captures 2D images, and *Picard* appears to propose an iterative technique (using the conjugate gradient) for analysis of 2D images obtained for a calibration object (that comprises beads arranged in it) to estimate parameters of the X-ray imaging device in order to automatically calibrate such device.

In response to the arguments presented in the Appeal Brief, the Examiner's Answer asserts that *Picard* discloses use of the iterative conjugate gradient algorithm for performing 3D reconstruction, *see* pages 10-18 of the Examiner's Answer. However, as discussed in detail in the Appeal Brief, *Picard* merely discusses use of the conjugate gradient algorithm for determining calibration parameters for an imaging device, and does not provide any teaching whatsoever of using such conjugate gradient algorithm in reconstructing 3D images from captured 2D images. While the imaging system of *Picard* may capture 2D images that can then be processed for reconstructing 3D images, the use of the conjugate gradient algorithm discussed at column 9 of *Picard* is solely described as being used in calibrating the imaging device for capturing the 2D images, and is not described as being used in any manner whatsoever in performing a 3D reconstruction.

Picard mentions that once the 2D images are captured by the properly calibrated imaging device, those images may then be processed for performing 3D reconstruction. For instance, col. 3, lines 8-11 provides "The present invention therefore proposes a device enabling an automatic calibration that can be applied to any system of 2D X-ray imaging and in particular to any system used for purposes of 3D reconstruction." As such, *Picard* expressly explains that its calibration is of the 2D X-ray imaging system, and while *Picard* recognizes that the 2D images captured by the 2D X-ray imaging system may be processed for reconstructing 3D images, *Picard* does not teach employing an iterative technique for performing such 3D reconstruction.

Accordingly, *Picard* proposes employing an iterative conjugate gradient algorithm for determining calibration parameters for a 2D X-ray imaging system. Once calibrated, the 2D X-ray imaging system may be employed to capture 2D images, which may then be processed in some way to reconstruct 3D images. However, *Picard* does not describe any specific technique for performing the 3D reconstruction, and certainly fails to teach "iteratively processing the received 2D images to reconstruct 3D image data therefrom" as recited by claim 1.

The Examiner's Answer further alleges, at page 11, that "Nowhere in the scope of the Claim 1 of the current invention it is specified that the iterative technique is for performing 3D reconstruction." Applicant disagrees. Claim 1 expressly recites "iteratively processing the

received 2D images to reconstruct 3D image data therefrom”. This clearly recites that the iterative technique is performed to process the 2D image for 3D reconstruction, which *Picard* simply fails to disclose.

In view of the above, *Picard* fails to teach iteratively processing received 2D images to reconstruct 3D image data therefrom, as recited by claim 1. Therefore, *Picard* fails to anticipate claim 1, and the rejection of record should be overturned.

Independent Claim 15

Independent claim 15 recites:

A system for processing 2D image data for reconstructing 3D image data therefrom, the system comprising:
means for receiving a plurality of 2D images acquired at different angles of view; and
means for iteratively processing the received 2D images to reconstruct 3D image data therefrom. (Emphasis added).

Picard fails to teach means for iteratively processing received 2D images to reconstruct 3D image data therefrom. Instead, as discussed above with claim 1, *Picard* is directed to calibrating an X-ray imaging device, in which *Picard* appears to teach iteratively processing 2D images to automatically determine parameters or calibration coefficients of the X-ray imaging device. Therefore, *Picard* fails to anticipate claim 15, and the rejection of record should be overturned.

Independent Claim 18

Independent claim 18 recites:

A system for processing 2D image data for reconstructing 3D image data therefrom, the system comprising:
an imaging system operable to capture a plurality of 2D images at different angles of view; and
a reconstruction processor communicatively coupled to the imaging system, said reconstruction processor operable to receive the plurality of captured 2D images and iteratively process the received 2D images to reconstruct 3D image data therefrom in accordance with a conjugate gradient algorithm.
(Emphasis added).

Picard fails to teach a reconstruction processor that is operable to receive a plurality of captured 2D images and iteratively process the received 2D images to reconstruct 3D image data therefrom in accordance with a conjugate gradient algorithm. Instead, as discussed above with claim 1, *Picard* is directed to calibrating a 2D X-ray imaging device, in which *Picard* appears to teach iteratively processing 2D images to automatically determine parameters or calibration coefficients of the X-ray imaging device. That is, *Picard* employs a conjugate gradient algorithm for processing 2D images of a calibrating object in order to determine calibration parameters of the X-ray imaging device, not for processing the captured 2D images for reconstructing 3D image data therefrom. Therefore, *Picard* fails to anticipate claim 18, and the rejection of record should be overturned.

II. Rejections Under 35 U.S.C. §103

Claims 7-10 are rejected under 35 U.S.C. §103(a) as being unpatentable over *Picard* in view *Elena*; and claim 12 is rejected under 35 U.S.C. §103(a) as being unpatentable over *Picard* in view of *Elena* and further in view of *Tam*. As shown above, *Picard* does not teach every feature of independent claim 1. Dependent claims 7-10 and 12 each depend either directly or indirectly from independent claim 1 and, thus, inherit all of the limitations of independent claim 1. Neither *Picard* nor *Elena* are relied upon as teaching the above-noted deficiency of *Picard* regarding claim 1, nor do they appear to teach all elements of claim 1. Appellant respectfully

submits that dependent claims 7-10 and 12 are therefore allowable based at least on their dependency from claim 1 for the reasons discussed above.

Additionally, the present application addresses the teachings of *Elena*, and explains that *Elena* proposes application of the conjugate gradient for processing captured 1D image data for reconstructing 2D image data therefrom. As the present application explains at paragraphs 0083-0085, it was not apparent to one of ordinary skill in the art whether the conjugate gradient method could be extended for application in 3D image reconstruction. Further, as explained in paragraphs 0107-0108 of the present application, prior to the invention by the present inventors, serious questions existed from *Elena* regarding whether the conjugate gradient method could be practically extended to 3D image reconstruction, including questions concerning convergence of the method, number of required iterations and computation time involved.

Accordingly, as discussed above, *Picard* does not propose use of the conjugate gradient method for reconstructing 3D image data from received 2D images, but instead proposes use of the conjugate gradient method for determining calibration parameters to set for a 2D X-ray imaging system. While the 2D image system, once calibrated, may be used to capture 2D images that may be further processed for reconstructing 3D images therefrom, *Picard* does not address such 3D reconstruction technique and certainly does not propose using the conjugate gradient algorithm in performing the 3D reconstruction. Additionally, *Elena* fails to teach or suggest using the conjugate gradient algorithm for performing 3D reconstruction, but as the present application explains, *Elena* merely proposes its use for 2D reconstruction. As discussed above, the extension of the application of the conjugate gradient algorithm to 3D reconstruction was not at all obvious (and was questionable as to whether it would have been practically possible). As such, the reliance on *Elena* in the Final Office Action is largely misplaced, as it is concerned with 2D reconstruction rather than 3D reconstruction.

Accordingly, the rejections of claims 7-10 and 12 should likewise be overturned.

IV. CONCLUSION

In view of the above, Appellant requests that the board overturn the outstanding rejections of claims 1-10 and 12-20.

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with § 1.6(a)(4). Dated: November 14, 2007 Signature: <u>Donna Forbit</u> (Donna Forbit)
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